

High Temperature Materials and Sensors for Propulsion Systems

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Description:

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Advanced materials, structures and sensors are crosscutting technologies which are essential in the design, development and health maintenance/detection needs of components and subsystems that will be needed in future generations of aeronautics and space propulsion and power systems. Materials will require multiple or tailored functions that are designed to meet specific mission needs. Lightweight, high temperature, environmentally stable and multifunctional materials and reliable structures will be needed to meet the challenges of future aerospace systems. Improved temperature capability enables increased thermodynamic efficiency and improved performance.

- Develop innovative approaches to enhance the durability, processability, performance and reliability of advanced high temperature materials (metals, ceramics, polymers, high-strength fibers, composites, nanostructured materials and coatings to improve environmental durability.
- Develop and demonstrate hierarchical assembly of nano and microstructures to give ultra-lightweight materials with unique thermal, electrical, and/or mechanical properties.
- Multifunctional materials and structures as a means to reduce component weight.
- Physics based modeling tools that capture the modes of materials degradation in the

extreme environments found in propulsion systems.

Innovative smart sensing methods and measurement techniques that can reliably assess component health in the harsh environments experienced in aerospace engines and vehicles that go beyond the limits of current sensing technology. Interest is in:

- Sensors and systems with a fast response, able to be used at high temperatures, low volume and weight, be minimally intrusive and possess high accuracy and reliability.
- Development of nano-sensor technology allowing sensors that are smaller, more energy efficient and the ability to provide more sensitive health assessments.
- Approaches to measure strain, temperature, heat flux, deflection, acoustics and/or acceleration of structural components.
- Integration of sensors into systems (wireless, wired or fiber optic).